

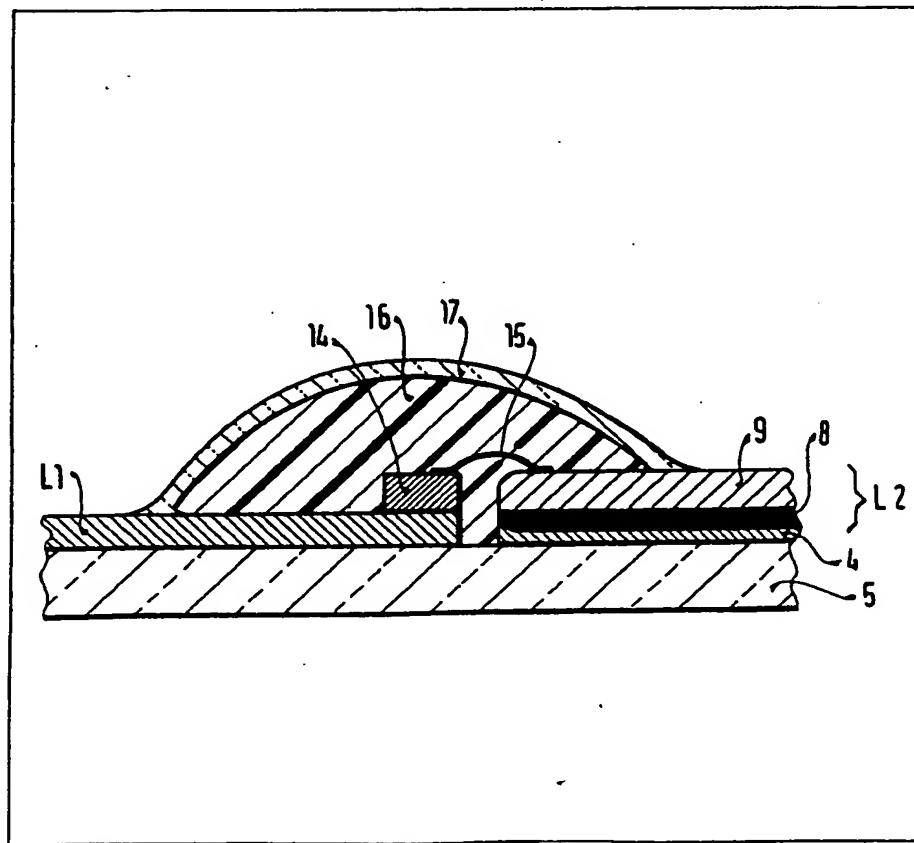
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(54) Light-emitting diode assembly

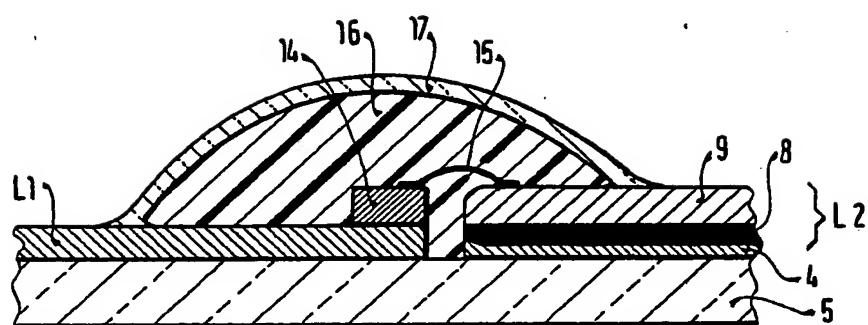
(57) There is disclosed a light-emitting diode assembly comprising a light-emitting diode chip (14), arranged on a substrate plate (5), and a light diffusion element associated with the light-emitting diode chip. The light diffusion element is formed by a transparent cast-resin material (16), which covers the light-emitting diode chip (14) right down to the substrate plate (5) and has a substantially convex surface. The substrate plate (5) is also made of transparent material. To the cast-resin material (16) there is applied a reflecting coating (17), which covers the cast-resin material (16) right down to the substrate plate (5). The light-emitting diode chip (14) is attached by means of an electrically conductive adhesive to a conductor path, formed from transparent material, arranged on the substrate plate (5).



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**SPECIFICATION****Light-emitting diode assembly**

5 The invention relates to light-emitting diode assemblies and is particularly concerned with such an assembly of the type comprising a light-emitting diode chip arranged on a substrate plate, and a light diffusion element associated with the light-emitting diode chip.

10 In a known light-emitting diode assembly of this type, the light diffusion element is a discrete operating component which is arranged directly downstream of the light-emitting diode chip in the direction of light emission. The substrate plate is made of opaque material. The discrete operating component must be attached to the substrate plate by means of special retaining elements. The light-emitting diode chip must be viewed from the side of the substrate plate adjacent to the operating component.

15 A light-emitting diode assembly in accordance with the present invention comprises a light-emitting diode chip arranged on a substrate plate, and a light diffusion element associated with the light-emitting diode chip and formed by a transparent cast-resin material which covers the light-emitting diode chip right down to the substrate plate and has a substantially convex surface, the substrate plate also being made of transparent material, and

20 there being applied to the cast-resin material a reflecting coating which covers the cast-resin material right down to the substrate plate.

In contrast to the known art, a light-emitting diode assembly in accordance with the present invention has the advantage that its manufacture is rendered substantially simpler and more economical, and that the light-emitting diode chip can be viewed through the substrate plate.

The invention is described further hereinafter, by way of example, with reference to the accompanying drawing which is a cross-sectional view, normal to the substrate plate, of one embodiment in accordance with the present invention.

In the light-emitting diode assembly shown in the drawing, there are applied to a transparent substrate plate 5, which is made, for example, of glass, a transparent first conductor path L<sub>1</sub> of tin dioxide or indium oxide, and an opaque second conductor path L<sub>2</sub>. The second conductor path L<sub>2</sub> comprises a base layer 4 of tin dioxide or indium oxide, an intermediate layer 8 of tin or indium, and a gold covering layer 9. To one end of the first conductor path L<sub>1</sub> there is adhesively attached a light-emitting diode chip 14 by means of a conductive adhesive. A gold bonding wire 15 forms a conductive connection between the light-emitting diode chip 14 and the second conductor path L<sub>2</sub>. The light-emitting material 16, which serves as a light diffusion element, having a substantially convex surface and preferably consisting of silicone resin. The cast-resin material 16 is produced by drip-position, and also serves for protection of the chip 14 and the wire 15. There is also provided a reflecting coating 17, which is applied to the cast-resin material 16, for example, by silver-spraying, by treatment with white paint, or by vapour-coating

with aluminium. The effect of the reflecting coating 17 is that the light-emitting diode chip 14 can be viewed through the substrate plate 5, since the light is reflected by the coating 17.

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**CLAIMS**

1. A light-emitting diode assembly comprising a light-emitting diode chip, arranged on a substrate

25 plate, and a light diffusion element associated with the light-emitting diode chip and formed by a transparent cast-resin material which covers the light-emitting diode chip right down to the substrate plate and has a substantially convex surface, the substrate plate also being made of transparent material, and there being applied to the cast-resin material a reflecting coating which covers the cast-resin material right down to the substrate plate.

30 2. A light-emitting diode assembly as claimed in claim 1, in which the light-emitting diode chip is attached by means of an electrically conductive adhesive to a first conductor path, made of transparent material, arranged on the substrate plate.

35 3. A light-emitting diode assembly as claimed in claim 1 or 2, in which the cast-resin material consists of silicone resin.

40 4. A light-emitting diode assembly as claimed in any of claims 1 to 3, in which the first conductor path consists of a metallic oxide.

45 5. A light-emitting diode assembly as claimed in claim 4, in which said metallic oxide is tin dioxide or indium oxide.

50 6. A light-emitting diode assembly as claimed in any of claims 1 to 5, in which the surface of the light-emitting diode chip remote from the substrate plate is connected by means of a bonding wire to a second conductor path.

55 7. A light-emitting diode assembly as claimed in any of claims 1 to 6, in which the substrate plate is made of glass.

60 8. A light-emitting diode assembly substantially as hereinbefore described with reference to the accompanying drawing.

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